

Before I finish I may allow myself the observation, that, till now, the whole family of *Muscicapidæ* has been in a condition of the greatest confusion, and that the greatest number of genera must go down, or must be considered as subgenera of some larger genera.

## ROYAL SOCIETY.

May 27.—“ Upon the Morphology of the Cephalous Mollusca, as illustrated by the Anatomy of certain Heteropoda and Pteropoda.” By Thomas Huxley, Esq., F.R.S.

In the present memoir the author endeavours to determine, upon anatomical and embryological grounds, the true homologies of the different organs of the Cephalous Mollusca, and thence to arrive at some idea of the archetypal form, as definite modifications of which the existing molluscous forms may be considered to have arisen.

The Pelagic Heteropoda and Pteropoda, from their small size and extreme transparency, are peculiarly favourable subjects for the anatomical part of this investigation, and it is from a detailed examination of those systems of organs which are of importance for the purpose that the author deduces the following conclusions:—

1. In the *Heteropoda* the intestine is bent towards the dorsal or *hæmal* side in consequence of the development behind the anus of the visceral “hernia,” which is therefore called a *post-abdomen*.

2. In the *Heteropoda*, the “foot,” in its most perfect condition, consists of three portions, a *propodium*, *mesopodium* and *metapodium*.

3. The *Heteropoda* are more or less prosobranchiate, the degree depending upon the amount of development of the post-abdomen.

4. In the *Pteropoda* the intestine is bent towards the ventral or *neural* side, in consequence of the development of the visceral “hernia” in front of the anus. It is therefore called an *abdomen*.

5. In the *Pteropoda*, the foot, besides the parts mentioned above, possesses an additional appendage, the *epipodium*, which forms the expanded wing characteristic of the group.

6. The *Pteropoda* are opisthobranchiate, prosobranchiate, or intermediate in character, according to the degree of development of the *abdomen*.

The *Heteropoda* and *Pteropoda*, then, may be considered to represent two opposite phases of the modification of the molluscous archetype.

In the second part of the paper, the author endeavours, by carefully collating the known facts of the development of the Mollusca, to ascertain (*a*) the primary form of all cephalous Mollusca, and (*b*) the mode in which, in the course of development, this embryonic form becomes metamorphosed into the adult form; in order, if possible, to account, on the safe basis of ascertained morphological laws, for the peculiar modifications of structure which have been found, anatomically, to obtain among the Heteropoda and Pteropoda.

He finds that it is possible not only to deduce the structure of the Heteropoda and Pteropoda from a simple and symmetrical archetype by such morphological laws, but that all the cephalous Mollusca

fall under one or other of the great types of which these have been taken as exemplifications.

After a discussion of the various theories of the homology of the organs of cephalous Mollusca proposed by Lovèn, Leuckart, &c., the following general conclusions are set forth:—

1. The cephalous Mollusca are all organized after the same fundamental form or archetype.

2. The arrangement of the systems of organs within this archetype is essentially the same as in the Vertebrata and Annulosa; that is to say, supposing the digestive system to form the axis of the body, the nervous centre lies on one side of that axis; the blood-vascular centre upon the opposite; and furthermore, the archetype is symmetrical with regard to a longitudinal vertical plane, passing through these three.

3. The *molluscan* archetype differs from the *vertebrate* in the circumstance—1, that the mouth opens upon the neural surface; 2, that the embryo commences its development upon the hæmal side.

It differs from the *articulate* archetype in the latter circumstance, and from both in the fact, that the proper appendicular system (represented by the epipodium) is almost rudimentary, and that the locomotive function is mainly performed by a development of the neural surface.

4. The process of concentration and fusion of parts by which the principal modifications are produced among the Vertebrata and Articulata, seems almost absent in the Mollusca; the changes among them being produced by an asymmetrical development of the primarily symmetrical archetype, a process comparatively rare among the Articulata and Vertebrata.

5. The part thus asymmetrically developed is invariably a portion of the hæmal surface, and may be called an *abdomen* or a *post-abdomen*, according as it is placed before or behind the anus.

6. The intestine is found to be bent in two directions among the Mollusca, hæmad or neurad, and these flexures correspond with the development of a post-abdomen or abdomen, respectively.

7. The process of development demonstrates that the Tectibranchiata, Nudibranchiata and Pectinibranchiata (in part at least) belong to the former division, and that the Cephalopoda and Pulmonata belong to the latter.

8. Anatomical evidence shows that the Heteropoda have a hæmal flexure of the intestine, the Pteropoda a neural flexure; and it is almost certain that when their development is traced, the former will be found to have a post-abdomen, the latter an abdomen; there will then be two great divisions of the cephalous mollusca.

a. Those which develop an abdomen:—*Cephalopoda*, *Pteropoda*, *Pulmonata*.

b. Those which develop a post-abdomen:—*Heteropoda*, *Pectinibranchiata*, *Tectibranchiata*, *Nudibranchiata*.

9. Prosobranchism and Opisthobranchism may occur as secondary results of either course of development.

10. The principal nervous centres are similar in number and posi-

tion throughout, and differ only in their arrangement and degrees of concentration. The amount of the latter does not correspond with the complexity of organization of the mollusk, but rather the reverse.

11. The organization of the vascular system is equally uniform; its completeness or incompleteness is no mark of complexity or simplicity of the rest of the organization.

12. The cephalous Mollusca are characterized by the possession of a peculiar organ, the dentigerous "tongue," whose mode of action resembles that of a chain-saw.

13. The locomotive apparatus, when fully developed, consists of four parts, the propodium, mesopodium, metapodium and epipodium. These parts are least modified in such mollusks as *Atlanta* or *Pneumodermon*; most altered and disguised in such as *Cleodora* or *Ocotopus*.

14. The term "mantle" should be confined to the surface of the *abdomen* or *post-abdomen*, and to the prolonged edges of that surface.

15. It is of great importance to recollect that the "shells" are probably not homologous organs in all the different forms of mollusks.

The shells of *Sepia*, *Spirula* (?), *Limax*, *Clausilia* and *Helix* are developed in the thickness of the mantle.

The shells of *Nautilus* (?), *Pectinibranchiata*, &c., are developed from the surface of the mantle by a quite distinct process.

Certain curious differences appear to follow the externality or internality of the shell.

An external shell in a mollusk with a hæmal flexure, *e. g.* *Atlanta*, has its columellar axis *below* the aperture.

An external shell in a mollusk with a neural flexure, *e. g.* *Nautilus*, has its columellar axis *above* the aperture.

An internal shell in a mollusk with a neural flexure, has its columellar axis *below* the aperture, *e. g.* *Spirula*, *Clausilia*, *Helix*.

In the course of the memoir the author incidentally introduces a number of new, and, as he believes, important facts, with regard to the nervous, circulatory and urinary systems; and describes at length the mechanism of the "tongue" and an organ similar to the "crystalline style" of bivalves, found in the *Strombidæ*.

#### LINNEAN SOCIETY.

March 16, 1852.—Robert Brown, Esq., President, in the Chair.

Read a "Notice of the habits of *Myrmica domestica*, Shuck., together with some account of a means of turning the industry of this minute Ant to account in the preparation of Skeletons of small animals." By George Daniell, Esq.

Mr. Daniell states that his attention was first attracted to this species of Ant some years ago by observing several individuals engaged, in the window of a house in Edwards Street, Portman Square, in dragging to the edge of the casement a large fly, which they finally succeeded in conveying through an opening in the wall.